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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/826,733

04/16/2004

Masataka Shinoda

075834.00485

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10/30/2008

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EXAMINER

GOMA, TAWFIK A

ART UNIT

PAPER NUMBER

2627

MAIL DATE

DELIVERY MODE

10/30/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/826,733	Applicant(s) SHINODA, MASATAKA	
	Examiner TAWFIK GOMA	Art Unit 2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5,8,9,12,13,16-21 and 24-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,8,9,12,13,16-21 and 24-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to the amendments filed on 8/11/2008.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim is directed to a “double-convex lens”, but the specification only describes a convex lens (pars. 8, 15, and 112).

Claim 26 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim is directed to a Numerical Aperture which is greater than 2. The Specification only discloses a Numerical Aperture greater than 1, and enables the disclosure using an example where the numerical aperture is 1.86 (par. 106). A disclosure that only recites that the NA can be greater than 1 is not on its own enabling of an NA of greater than 2.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5, 8-9, 12-13, 16-17, 22-23, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al (US 6243350) in view of Okubo (US 2003/0118936) and further in view of Ichimura et al (US 6600714)

Regarding claim 1, Knight discloses an optical recording system including a recoding/reproducing optical head having an objective lens (fig. 30b) and an optical recording medium recorded and reproduced with irradiation of light thereon from said optical head, said irradiation of light being made by an objective lens of which numerical aperture is larger than 1 (col. 35 lines 57-63, $NA = NA \text{ of Objective lens } (.65) \times \text{Refractive index of SIL } (2) = 1.3$), said optical recording medium comprising at least a silicon oxide layer and a recording layer being formed over a substrate, in that order (col. 37 line 12). Knight further discloses wherein said recording layer has formed thereon a protective layer of which refractive index is larger than a numerical aperture of said objective lens (SiN, col. 37 line 12 and lines 3-6). Although Knight discloses that the any write-once, or phase change material can be used as the recording layer, he fails to disclose a silicon recording layer. In the same field of endeavor, Okubo discloses a recording medium with a silicon recording layer (par. 83). It would have been obvious to one of ordinary skill in the art to use a silicon recording layer as taught by Okubo in the recording medium taught by Knight. The rationale is as follows: One of ordinary skill in the art would

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have been motivated to use a silicon recording layer as a suitable write-once recording material since Knight (col. 29 lines 44-67) suggests using any suitable write-once recording material and Okubo teaches that silicon is a suitable write-once material.

Further regarding claim 1, Knight in view of Okubo fail to disclose an optical radiation source for emitting light having a wavelength of between 300 nm and 500 nm, and that the numerical aperture of the objective lens is larger than 1 when irradiated with a wavelength of substantially 400 nm. In the same field of endeavor, Ichimura discloses a light having a wavelength of 405 nm and an objective lens which has a NA of greater than 1 used with that light (col. 5 lines 54-61). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to use a light of 405 nm with an NA greater than 1. The rationale is as follows: One of ordinary skill in the art would have been motivated to use a light of 405 nm in order to increase the recording density of the disc.

Regarding claim 2, Knight in view of Okubo and Ichimura disclose everything claimed as applied above. Further in regard to claim 2, it is known that an inherent property of silicon is that it is oxidized when irradiated by a recording laser, and pits are formed by changing silicon to silicon-oxide by the recording laser.

Regarding claim 5, claim 5 is rejected for the same reasons as claims 1 and 2 above.

Regarding claims 8 and 9, Knight further discloses wherein the recording layer and the protective layer each have a refractive index greater than the numerical aperture of the objective lens (col. 35 lines 65-67). Furthermore, in the combination of Knight and Okubo, a silicon recording layer is provided as a recording layer and an SiN protective layer of Knight is used as the protective layer. Okubo further discloses wherein the silicon recording layer and an SiN

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layer have a refractive index that would be much greater than the numerical aperture of the objective lens when irradiated with a wavelength of substantially 400 nm (Table 1, page 6 and par. 91).

Regarding claims 12 and 13, Okubo further discloses wherein the refractive index of the silicon recording layer is up to 3.9 but fails to disclose wherein the refractive index is greater than 4 when irradiated by said light (Table 1, page 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a refractive index of greater than 4. The motivation would have been: To apply a silicon recording layer with a refractive index greater than 4 as opposed to 3.9 in the course of routine engineering optimization/experimentation. Moreover, absent a showing of criticality, i.e., unobvious or unexpected results, the relationships set forth in claims 12-13, the limitations are considered to be within the level of ordinary skill in the art.

Additionally, the law is replete with cases in which the mere difference between the claimed invention and the prior art is some range, variable or other dimensional limitation within the claims, patentability cannot be found.

It furthermore has been held in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range(s); see *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claims 16 and 17, Knight further discloses wherein said solid immersion lens (SIL) shaped like a conical surface (figs. 6 and 7).

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Regarding claims 22 and 23, Knight further discloses the limitations of claim 1 wherein the objective lens is defined as the single lens of the optical head closest to the optical recording medium (SIL, col. 35 lines 61-65). The SIL of Knight has a refractive index of 2.00, and the NA of a lens is calculated as $n * \sin \theta$ (n being the refractive index of the material). Therefore, the maximum possible NA of the single SIL lens of Knight is found at $\theta = 90^\circ$, resulting in an $NA = n = 2$ for Knight's lens. This NA is less than the refractive index of the protective layer ($SiN = 2.07$) disclosed by Knight.

Regarding claim 27, Knight in view of Okubo fail to disclose the refractive index value of the Silicon Dioxide layer at a wavelength of substantially 400 nm. In the combination above, Ichimura discloses the use of 405 nm with a near-field apparatus to produce an NA of greater than 1. Ichimura further discloses that the refractive index of a Silicon Dioxide layer is less than 1.5 at the wavelength of 405 nm (col. 12 lines 56-61). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to provide a Silicon Dioxide layer which has a refractive index of less than 1.5 for a wavelength of 405 nm as disclosed by Ichimura. The rationale is as follows: One of ordinary skill in the art at the time of the applicant's invention would have used the Silicon Dioxide layer of Ichimura as it would have been the use of a known element in a similar device which would yield predictable results.

Claims 18, 19, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al (US 6243350) in view of Okubo (US 2003/0118936) and Ichimura et al (US 6600714) and further in view of Ueyanagi (US 6704250).

Regarding claims 18, 19, 24 and 26, Knight further discloses the SIL (3012, fig. 30b), but fails to disclose wherein the SIL has a main component material selected from the group

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consisting of SrTiO_3 , $\text{Bi}_4\text{Ge}_2\text{O}_{12}$, and $\text{Bi}_4\text{Ge}_3\text{O}_{12}$. In the same field of endeavor, Ueyanagi discloses a condensing medium with a main component material SrTiO_3 (col. 6 lines 34-38 and). It would have been obvious to one of ordinary skill in the art to provide an SIL disclosed by Knight with a main component material of SrTiO_3 . The rationale is as follows: One of ordinary skill in the art at the time of the applicant's invention would have provided an SIL with a main material component of SrTiO_3 as a simple substitution of one known element for another known element in the art which would yield predictable results.

Further regarding claims 24 and 26, the materials disclosed by Ueyanagi for the SIL cause the objective lens to have a numerical aperture larger than 1 (2 for claim 26) when irradiated with a wavelength of substantially 400 nm since it is the same material used by applicant to achieve that result.

Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al (US 6243350) in view of Okubo (US 2003/0118936) and Ichimura et al (US 6600714) and further in view of Yamada et al (US 5024927).

Regarding claims 20 and 21, Knight in view of Okubo and Ichimura disclose a recording medium with a substrate, a reflection film, a silicon oxide layer, a silicon recording layer and an SiN protective layer as applied in the combination above. Knight in view of Okubo and Ichimura fail to disclose wherein the silicon oxide layer is formed directly on the substrate. In the same field of endeavor, Yamada discloses providing a recording medium with a substrate, a silicon oxide layer formed directly on the substrate (2, fig. 2), a recording layer formed directly on the silicon oxide layer (3, fig. 2), and a protective layer formed directly on the recording layer (4, fig. 2). It would have been obvious to one of ordinary skill in the art at the time of the

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applicant's invention to modify the medium disclosed by Knight in view of Okubo and Ichimura by eliminating the reflective layer as suggested in Yamada. The rationale is as follows: One of ordinary skill in the art at the time of the applicant's invention would have eliminated the reflective layer as a simple substitution of one known element for another which would obtain predictable results (see Yamada, col. 9 lines 45-51).

Further regarding claims 20 and 21, Knight further discloses wherein the recording layer and the protective layer each have a refractive index greater than the numerical aperture of the objective lens (col. 35 lines 65-67). Furthermore, in the combination of Knight and Okubo, a silicon recording layer is provided as a recording layer and an SiN protective layer of Knight is used as the protective layer. Okubo further discloses wherein the silicon recording layer and an SiN layer have a refractive index that would be much greater than the numerical aperture of the objective lens when irradiated with a wavelength of substantially 400 nm (Table 1, page 6 and par. 91).

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al (US 6243350) in view of Okubo (US 2003/0118936) and Ichimura et al (US 6600714) and further in view of Kamiyama et al (US 6043940).

Regarding claim 25, Knight in view of Okubo and Ichimura fail to disclose wherein the other lens is a convex lens. In the same field of endeavor, Kamiyama discloses the use of a double-convex lens in conjunction with an SIL lens such that the convex lens is positioned on a side of the SIL opposite the recording medium (4, fig. 2 and col. 4 lines 9-22). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to use the biconvex lens of Kamiyama. The rationale is as follows: One of ordinary skill in the art at the

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time of the applicant's invention would have been motivated to use the biconvex lens as it would have been the use of a known element to improve a similar device in the same way which would yield predictable results.

Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knight et al (US 6243350) in view of Okubo (US 2003/0118936) and Ichimura et al (US 6600714) and further in view of Naito (US 6197399).

Regarding claims 28-29, Knight in view of Okubo disclose a Silicon recording layer, a Silicon Oxide layer and a Silicon Nitride layer as the protective layer as applied to claim 1 above. Knight in view of Okubo and Ichimura fail to disclose wherein the substrate is formed of silicon. In the same field of endeavor, Naito discloses the use of a silicon substrate on a disc configured for near-field recording (col. 4 line 67 through col. 5 lines 1-3). It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to use a silicon substrate as taught by Naito. The rationale is as follows: One of ordinary skill in the art at the time of the applicant's invention would have used a silicon substrate as a simple substitution of one known element for another which would yield predictable results.

Further regarding claim 29, in the combination discussed above where all of the layers are formed of silicon, the layer compositions are not harmful for the natural environment and would have a small load to the natural environment since they are all made of Silicon compounds.

Response to Arguments

Applicant's arguments regarding the Nagoya reference are moot in view of the new grounds of rejection.

Applicant's arguments regarding the range limitation of claims 12 and 13 is not persuasive because the section of the MPEP which applicant is referencing discusses the use of overlapping ranges or ranges that partially touch in Section 102 rejections. The rejection relied upon by the examiner is a Section 103 rejection. A range which is close to the claimed range can be relied upon under Section 103 which takes differences into account. See *Titanium Metals Corp. v. Banne*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) holding that prior art which "discloses two alloys having compositions very close to that of claim 3, which is 0.3% Mo and 0.8% Ni, balance titanium. The two alloys in the prior art have 0.25% Mo-0.75% Ni and 0.31% Mo-0.94% Ni, respectively. The proportions are so close that prima facie one skilled in the art would have expected them to have the same properties. Appellee produced no evidence to rebut that prima facie case. The specific alloy of claim 3 must therefore be considered to have been obvious from known alloys."

Applicant's arguments with respect to claims 18 and 19 are not persuasive for the following reasons: In response to applicant's argument that Ueyanagi is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Ueyanagi is both in the field of near-field optical (Magneto-optical) recording **and** is concerned with the same problem of finding a suitable material for forming an SIL having a particular refractive index.

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Applicant's arguments regarding claims 20-21 have been considered and the rationale for combining the Yamada reference is that it would have been a simple substitution of providing a medium which eliminates a reflective layer in the recording stack with the medium which has a reflective layer which would yield predictable results as suggested by Yamada.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TAWFIK GOMA whose telephone number is (571)272-4206. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Feild can be reached on (571) 272-4090. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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